

10 BIG IDEAS



that can
increase the
challenge level for
high-achieving
students
in

TALENTED
AND
GIFTED

Mathematics

CONNECTICUT STATE
DEPARTMENT OF EDUCATION

Rationale

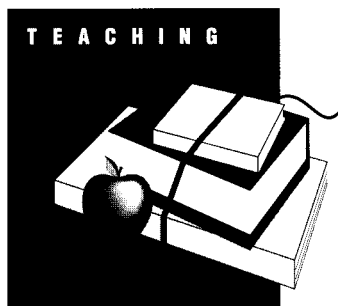
Thousands of gifted and talented young people and adolescents sit in classrooms across the state. Decades of research demonstrate that learning needs of gifted and talented students go beyond what is traditionally provided in regular classrooms. The nature of their abilities and talents, demonstrated or latent, require differentiated learning opportunities to help them realize their potential.

Connecticut educators genuinely care about *all* of their students and seek to meet the incredibly diverse learning needs of the students they face daily. Too often, however, classroom teachers do not have the tools, information, or support they need to meet these needs—particularly those of their gifted and talented students.

Connecticut educators genuinely care about all their students and want to meet the needs of the increasingly diverse learners in their classrooms.

Still, the responsibility for increasing the challenge level for gifted and talented students and for providing them with expanded learning opportunities rests largely with the classroom teacher.

This series of brochures is designed to provide classroom teachers, as well as teachers of the gifted and talented, with a number of practical ideas and resources for refining and expanding learning options to better meet these needs. The strategies were selected because they are inexpensive and readily adaptable by teachers. Although the 10 strategies listed here do not replace the powerful services of a full-time enrichment specialist and program for the gifted, we hope that all teachers will use the strategies systematically and that, over time, their use will lead to an increasing array of high-level learning options for gifted and talented students in Connecticut.



Great Links

Ask Dr. Math (<http://forum.swarthmore.edu/dr.math/dr-math.html>)

This is a huge consortium of links to K-12 mathematics-related activities and resources. Additionally, site visitors can participate in math forums and exchange math questions and ideas with each other. Forum Web Units and Lessons, Pascal's Triangle and Famous Problems in the History of Mathematics are highlighted Forum Pages. A favorite includes: Symmetry and Pattern: The Art of Oriental Carpets.

The Mathman

(<http://www.shout.net/~mathman>)

This website uses real-world problems to illustrate mathematical topics such as graphs and equations. One link includes sample calculus lessons for elementary students.

The Geometry Center

(<http://www.geom.umn.edu>)

The Geometry Center is filled with real-world problems related to geometry, resources, syllabi for innovative geometry courses and more. Interactive exhibits explore many topics including, for example, how rainbows are built using a mathematical model to explain the phenomenon.

The Chance Database

(<http://www.dartmouth.edu/~chance/>)

This database contains material designed to help teach a chance course. The aim of the database is to make students more informed, critical readers of current news that uses probability and statistics as reported in daily newspapers. A discussion site is included.

Fibonacci Numbers and the Golden Section

(<http://www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/fib.html>)

This is an award-winning site that contains over 200 pages of information about Fibonacci numbers and the golden section and golden string. Categories of information include, for example, Fibonacci numbers and Golden sections in nature, the intriguing mathematical world of Fibonacci and Phi, and applications of Fibonacci numbers and Phi.

1 Adopt mathematics materials that are challenging and raise expectations for all learners. Look for teacher's editions that have pre- and post-assessments as well as substantive, instructional strategies and learning activities for students who are just beginning learners with respect to the concept, those who know something about the concept, and those who know a great deal about it and need more challenging learning activities. Examine the learning activities to ensure that learning activities provide students with real-world activities in problem solving, reasoning and communication (see NCTM's *Standards*). The K-12 Mathematics Curriculum Center serves school districts interested in mathematics programs that are consistent with the Standards and provides a variety of services (<http://www.edc.org/mcc/>).

2 Incorporate supplementary materials that align with the Standards to broaden instruction and relate mathematical concepts to real-world problem solving. The names of exemplary supplementary mathematics materials are listed in *The Connecticut Mathematics Improvement Kit*, pp. 81-88. See your principal for a copy or request one from the State Department of Education, jeanne.purcell@po.state.ct.us.

3 Assess students' understanding of material *before* beginning an instructional unit. Preassessments can be paper-and-pencil, as well as performance-based. If critical differences are revealed in the preassessments, develop differentiated learning activities for small, flexible, within-class groups. Monitor students' progress regularly and regroup accordingly; document student progress.

4 Use the Internet to challenge all students. Based upon their exploration of various mathematics websites, precocious students may identify high-interest topics for independent investigations.

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BIG IDEAS

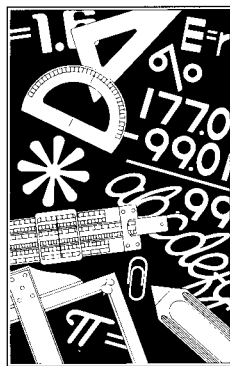
- 5** Promote student participation in mathematics contests and competitions, including:
- Continental Math League (grs. 2-9), Richard Kalman or John Lufrano, (516) 584-2016, (<http://www.li.net/-majorbar/cml>).
 - Math Olympiads (Division E: grades 4-6; Division M: grade 7), (516) 781-2400, <http://www.moems.org>.
 - Johns Hopkins Talent Search (grades 2-8), (410) 516-0278, <http://www.jhu.edu/gifted>.

More contests and competitions can be found in: *All the Best Contests for Kids*, ISBN 0-89815-451-0, and *The Ultimate Guide to Student Contests*, Grades 7-12, ISBN 0-8027-7512-8.

- 6** Develop math enrichment clubs before/after school or during lunch. The following is a sampler of games and related activities that support mathematical thinking and that can be used for enrichment: Rush Hour (spatial and logical thinking), Set (Attributes), Tangrams (patterning and spatial thinking), Dominoes (number relationships), Chess (logical thinking), Mancala (logical thinking and patterns) The Stock Market Game (usually sponsored by statewide newspapers).

- 7** Create a learning/interest center around a compelling and generative mathematics idea (i.e., centrality to the discipline, richness of connections), such as, for example: measurement, functions, series and sequences, or probability. Ensure that the center includes learning activities for advanced students. Develop a repertoire of mathematics centers for teachers to share. Invite precocious mathematics students to create their own center for the class around a topic of their choice.

- 8** Institute "Problem of the Day" or "Problem of the Week." Gather problems from past competitions of Continental Math League or Math Olympiad, for example. MindWare (<http://www.mindwareonline.com>) and Marcy Cook (<http://www.marcycookmath.com>) also carry books of mathematics problems.



- 9** Provide a wide array of advanced-level learning options for precocious mathematics students in their secondary school years. The options may include: independent investigations, mentorships, Advanced Placement courses, or concurrent enrollment at a local college or university.

- 10** Attend a local mathematics conference. ATOMIC (Associated Teachers of Mathematics in Connecticut) is held annually and features timely presentations for teachers. Contact Janice Vuolo at ACES (203) 407-4443 or by e-mail: vuolo@aces.k12.ct.us. ATOMIC is on the web: www.atomic.necaweb.com. CAMPY (Connecticut Association for Mathematically Precocious Youth) is held twice a year and includes programs for both teachers and gifted young people. Contact Judy St. Marie at (860) 848-9208. Bring back challenging learning and problem-solving activities for all students, including those with high abilities in mathematics.